



**STATE OF MONTANA
MONTANA DEPARTMENT OF TRANSPORTATION
JOB PROFILE**

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Update

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Formal Review

Date Submitted _____

SECTION I - Identification

**Working Title: Traffic Signal/Communications
Technologist**

Department: Transportation

Job Code Number: 492235

**Division & Bureau: Maintenance,
Communication Bureau**

Job Code Title: Communications Technologist

Section & Unit:

Pay Band: 5

**Work Address: 2701 Prospect Avenue
Helena, MT 59620-1001**

Position Number: 44002

Phone: 444-6305

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FLSA Exempt

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FLSA Non-Exempt

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Non-Union

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MPEA

☐

Blue Collar

**Profile Completed By: Steve Keller
Communications Bureau Chief**

Work Phone: 406-444-6305

Work Unit Mission Statement or Functional Description:

The MDT's mission is to serve the public by providing a transportation system and services that emphasize quality, safety, cost effectiveness, economic vitality and sensitivity to the environment.

The Maintenance Program provides for repairs and preventive maintenance of state highways, secondary highways, and the various signs and structures within the highway right-of-way. This includes winter plowing and sanding, year-round repairs to the state and secondary highway systems, responding to natural disasters, and the preservation and maintenance of all state maintained roadways, structures, rights-of-way, traffic control devices, buildings and other facilities, staff vehicles, and a fleet of highway maintenance equipment. The division is also responsible for coordinating cooperative agreements with counties for secondary highway maintenance responsibilities. The division protects Montana's and the Federal Government's investment in Montana's highway system and ensures the safety of the traveling public. Maintenance is responsible for: the Equipment Bureau; Communication Bureau; Facilities Bureau; Motor Pool; Maintenance Management System; Maintenance Review; State Sign Shop; Maintenance Support Services; MDT's Disaster and

Emergency Services; Hazardous Waste Program; the Underground Storage Tank (UST) Program; and MDT's Noxious Weed Program.

The Communications Bureau coordinates all engineering, installation, and maintenance for: MDT land mobile communication systems including all two-way mobile and portable radios, relays, and base stations, and MDT's remote weather information systems (RWIS). The Communications Bureau assists in the design, installation, and maintenance of the local and wide area computer networks; the land line telecommunication systems (land line telephone) utilized throughout the Department; the permanent and portable variable message signs (VMS) used across the state; the statewide fuel systems for MDT owned fuel sites; and the traffic signal and roadway lighting systems within the state maintained highway right-of-way. The Bureau also manages and oversees the cell phones and smartphones utilized by MDT personnel to complete their daily tasks.

Describe the Job's Overall Purpose:

This position serves as a State Traffic Signal Specialist and assists in the design; provides oversight in the construction and installation of; and is directly responsible for the repair and replacement of both traffic signal infrastructure (signal poles, signal indications, controller cabinets, pull boxes, etc.), and electrical/electronic devices (traffic signal controllers, conflict monitors, vehicle detection systems, etc.) associated with the safe and efficient operation of the Department of Transportation's traffic signal systems. This includes the design, specification, procurement, and installation of sophisticated electronic equipment used to detect vehicles, bicyclists, and pedestrians at signalized intersections, as well as, provide routine maintenance and inspection of the electronics and signal infrastructure required to operate the signalized intersections. This position assists in the specification, installation, and operation of various electro-mechanical devices found within the state's highway right-of-way used to convey relevant information to the traveling public – changeable speed limit signs, radar controlled speed signs, rapid flashing pedestrian warning beacons, and dynamic warning devices. This position completes requests for line locates in and around all traffic signals within their respective area and assists in locating buried conductors/conduit for roadway lighting circuits and other MDT owned facilities within the highway right-of-way to ensure no damage to the existing buried infrastructure occurs during time of construction/maintenance activities along the roadway and in compliance with state law. The position also assists with luminaire maintenance and operation as requested and as time permits. This position also coordinates planning, prioritizing, and implementation of projects affected by the operation of the traffic signals within their assigned area; provides technical advice and expertise to District personnel and the Traffic & Safety Bureau personnel regarding the operation and maintenance of the state's traffic signal systems.

To assist in the design, provide oversight in the construction and installation of, and to assist in the operation and maintenance of a land mobile radio communication system for the Department of Transportation and other state and federal agencies. This is accomplished by assisting the communications technologists within the communications bureau with the management, procurement, and installation of the radio communications equipment, and being directly responsible for the correct and efficient operation and maintenance of the mobile radio system in and around the state. To assist in the design, installation, operation, and maintenance of MDT's remote weather information system (RWIS) to provide up to date road/weather conditions to MDT personnel and the traveling public, and to assist in the operation and maintenance of the state's permanent and portable VMS. To engineer, analyze, and manage the performance and placement of a variety of other electronic equipment statewide as necessary.

SECTION II - Major Duties or Responsibilities

This section should be a clear concise statement of the position's major duties and the approximate percent of work time for each duty

% of Time

Under limited supervision, the incumbent will design, develop and present concepts and traffic signal system layouts to the Communications Bureau Chief. Using advanced knowledge of traffic signal design and operation, the incumbent will manage the performance, oversee the installation, conduct analyses and calibration of complex traffic signal systems. Assist in the coordination of the traffic signal systems implemented within the state; implement traffic signal system changes as requested; analyze and resolve system malfunctions; and repair or replace defective/malfunctioning electronic devices within the traffic signal systems.

With limited oversight from the communications technologists, the incumbent will assist in the installation and removal of land mobile radio systems; perform diagnostic evaluations of communications equipment; assist with the installation, operation, and maintenance of MDT's remote weather information system (RWIS); and assist in the operation and maintenance of the state's permanent and portable VMS.

A: Traffic Signal Technician

65%

I. Traffic Signal Systems Maintenance and Repair

45%

Develops electronic designs and schematics to plan and document optimum configurations, materials, and operational specifications for traffic signal systems. Researches solutions and alternatives to complex or alternative designs to ensure quality and safety while promoting cost-effective installations.

Analyzes traffic signal operation to identify both electronic and mechanical problems and resolve any issue in a cost effective manner. This involves applying a variety of diagnostic tools (system analyzers, VOLT/OHM meters, oscilloscopes, loop testers, etc.), technical expertise, and available technical specifications to locate and verify problems. Problems in the field frequently require the incumbent to develop original diagnostic methods and procedures according to specific and variable equipment, malfunctions, and field conditions.

Resolves electronic malfunctions with traffic signals, portable/permanent VMS, and other electrical/mechanical devices associated with the conveyance of information for the driving public by identifying physical damage or deficiencies, and other problems to ensure effective system operation. Develops approaches to specific equipment problems by researching or identifying technical documentation, performing hands-on technical repairs or adjustments, and testing the results of diagnostics and solutions to ensure that appropriate repairs have been implemented.

Determines installation requirements for new or upgraded signal systems by analyzing signal plans, technical specifications and standards, site features, and equipment requirements. Identifies additional or alternative installation requirements (e.g., parts, procedures, permits, etc.) necessary to ensure safe and effective installations.

Installs traffic signal, electrical/mechanical traffic control devices, and VMS systems, including electronic components (e.g., controllers, time clocks, microwave detectors, emergency vehicle detectors, etc.) and infrastructure (e.g., mast arms, span wires, pedestrian poles, etc.). This involves determining required and optimum components; coordinating with heavy equipment operators, construction personnel, fabricators, and others to secure necessary materials; and constructing safe and operable systems according to specifications.

Reviews, identifies conflicts, and locates underground circuits for all traffic signals affected by construction/maintenance activities within their respective areas. Assists with locating buried electrical circuits owned and operated by MDT in accordance with state law, including but not limited to, roadway/pathway lighting circuits, network communication systems within MDT maintenance facilities, RWIS circuits, and other buried appurtenances as requested and as time permits.

Assists maintenance personnel with the maintenance, operation, repair, and replacement of roadway lighting circuits and appurtenances within the highway right-of-way as requested and as time permits.

Monitors inventories of electronic, mechanical, and construction materials to ensure availability for traffic signal installation and repair projects. This includes projecting current and anticipated project needs; developing specifications and requisition requests for technical equipment; and tracking shipping, receiving, and warehousing data.

II. Project Coordination **20%**

Coordinates traffic signal installation and repair projects statewide to ensure conformance with standards and specifications; monitors initial and adjusted priorities; and resolves technical or procedural problems. Ensures appropriate tracking, documentation, and reporting of project details as required.

Coordinates and conducts traffic signal and peripheral traffic control equipment research projects assigned by the Communications Bureau Chief to test equipment configurations, effects of traffic management changes, and technological performance. Develops reports and recommendations for review and implementation on future projects.

Monitors and evaluates new technologies to identify system enhancements, equipment upgrades, and other improvements. This involves assessing new components, system needs, and compatibility issues; developing cost-benefit analyses; and proposing alternatives and enhancements to supervisors.

Assists District Traffic Signal Technicians and Department personnel as directed with vendor and contract administration. This includes maintaining ongoing liaisons with project vendors, monitoring projects and reporting problems or deficiencies to supervisors, completing documentation, and processing invoices as required.

B: Communications Technologist **30%**

I. Communications Systems Maintenance and Repair **20%**

Manage the performance and placement of complex electronic equipment associated with land mobile communications, which provide for the efficiency of day to day operations within the department and other agencies.

Install, remove, program, and troubleshoot problems associated with mobile/portable radio equipment installed in Department vehicles or used by Department personnel.

Evaluate and improve land/mobile communication system operation through the use of intellectual analysis and principles of troubleshooting in order to isolate and resolve obstacles which can hinder reliable land mobile communications.

Uses a wide variety of specialized computer software to program, interconnect, align, and diagnose microprocessor-based equipment. Restores performance of complex electronic circuits, associated with land mobile communications, using engineering schematics, electronic theory, and specialized test equipment to identify faulty parts to minimize repair costs.

Assists in the maintenance, operation, repair, and replacement of the Department's Traveler Information Systems (TIS) including the permanent/portable VMS and RWIS systems across the state.

II. Communications Systems Design and Construction Oversight **10%**

Provide technical expertise in the design, installation, operation and maintenance of wireless systems used to communicate within the traffic signal systems. Ensure appropriate procedures

specified by Federal Communications Commission (FCC) rules and regulations and departmental policies have been followed so that agencies serviced are not in violation. Using the knowledge and principles of electrical/electronic engineering, develops network documentation and schematic diagrams for future reference. Generates new ways of configuring systems and aligning inter-system parameters in order to save the department time and revenue. Develops solutions to correct problems as they arise.

C. Other Duties

5%

Performs a variety of other duties in support of District and Communications Bureau operations. This includes activities such as coordinating special projects, attending meetings and conferences, providing and participating in ongoing training, and performing other duties as assigned. Researches and procures necessary materials and parts for test and evaluation of new equipment to enhance overall operation. Researches and writes bid specifications for the purchase of new equipment needed to sustain the department's statewide traffic signal and communications systems and presents them to supervisors for approval.

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1. ***The following duties and/or specific tasks listed under section II above are considered "essential functions" because they require specialized expertise and skill and are the primary reasons the job exists (they must be performed by this position with or without accommodations): Duties A & B***

The following mental and physical demands are associated with these essential functions:

PHYSICAL

- Lifting heavy objects (construction materials, equipment, etc.) up to 100 lbs.
- Operation of bucket truck
- Ability to walk over uneven terrain or in water
- Extensive travel (over 1,500 miles/month)
- Travel modes may include snow shoes, snow mobiles, four wheel drive, horseback, and helicopter.
- Work in extreme adverse weather conditions
- Bend, twist, crawl
- Exposure to high voltage
- Maneuver in restrictive spaces

MENTAL

- Ability to multi-task
- Demands for accuracy in all aspects of work
- Ability to meet inflexible deadlines
- Decision making that affects public health and safety
- Computing arithmetic operations
- Comparing data
- Compiling information
- Analyzing
- Coordinating
- Synthesizing
- Work in stressful situations
- Ability to work at heights over 30 feet

2. Does this position supervise others? ☐ Yes ☒ No

Number directly supervised:

Position Number(s) of those supervised:

3. Attach an Organizational Chart.

SECTION III - Minimum Qualifications - List minimum requirements for the first day of work.

Critical knowledge and skills required for this position:

KNOWLEDGE:

This position requires extensive knowledge of electronics, telecommunication network methodologies, principles, practices and mechanical design, diagnosis, and repair; system calibration, testing, operation, and maintenance; highway safety issues; construction practices and procedures; and applicable Department, state, and federal standards and requirements including a thorough knowledge of the Manual on Uniform Traffic Control Devices (MUTCD), a working knowledge of the National Electrical Manufacturers Association (NEMA) standards for TS-1 and TS-2 traffic signal cabinets and controllers, a working knowledge of the FCC rules and regulations, and a working knowledge of the National Electrical Code. Electronic and computer diagnoses and troubleshooting require general knowledge of computer programming methods, networking, communication protocols and procedures; specialized analog and digital equipment; and technical troubleshooting methods, procedures, and techniques.

SKILLS:

This position requires skill in reading and understanding traffic signal design plans; diagnostic schematics, operations manuals, and technical specifications; calibrating and configuring specialized traffic signal, and VMS systems; system analyzers, oscilloscopes, volt meters, soldering irons, watt meters, time domain reflectometers, and other tools used for equipment calibration, maintenance, and repair; and the ability to communicate effectively both verbally and in writing. The position also requires skill in testing, diagnosing, and resolving technical problems; planning and coordinating work with utilities, contractors, and other state agencies; operating personal computers and specialized software; and safely and effectively operating heavy vehicles and equipment.

Behaviors required to perform these duties:

See MDT Core Behaviors

Education:

Check the one box indicating minimum education requirements for this position for a new employee the first day of work:

- | | |
|---|---|
| <input type="checkbox"/> No education required | <input checked="" type="checkbox"/> Related AAS/2-years college/vocational training |
| <input type="checkbox"/> High school diploma or equivalent | <input type="checkbox"/> Related Bachelor's Degree |
| <input type="checkbox"/> 1-year related college/voc. training | <input type="checkbox"/> Related Master's degree |

Please specify the acceptable fields of study:

Acceptable: The position requires two-year degree or certification in electronics, telecommunications, construction technology, or closely related field.

Other education, training, certification, or licensing required (specify):

The position requires Level II IMSA Certification and a valid Montana driver's license.

Retain recognized professional certification in the field of telecommunications, such as a general class Federal Communications Commission (FCC) Radio Telephone Operators License, Personal Communications Industry Association (PCIA) or Association of Public safety and Communications Officials (APCO).

Experience:

Check the one box indicating minimum work-related experience requirements for this position for a new employee the first day of work:

- | | |
|---|---|
| <input type="checkbox"/> No prior experience required | <input checked="" type="checkbox"/> 3 years |
| <input type="checkbox"/> 1 year | <input type="checkbox"/> 4 years |
| <input type="checkbox"/> 2 years | <input type="checkbox"/> 5 or more years |

Other specific experience (optional):

The position requires a minimum of three (3) years of experience in electronics or construction technology related to traffic signal systems, or land mobile radio communications including project development, system installation and working familiarity with various systems and network designs.

Alternative Qualifications:

This agency will accept alternative methods of obtaining necessary qualifications.

- ☒ Yes ☐ No

Alternative qualifications include:

Equivalent combinations of education and experience may be considered on a case by case basis.

SECTION IV – Other Important Job Information



Fingerprint background check



Valid driver's license



Background check



Other; Describe

Other information including working conditions such as shifts, lifting requirements, travel or hours.

The incumbent must be able to perform work activities under periodic stressful situations. Be in a travel status that often requires the employee to be away from home for consecutive days at a time. Travel alone in excess of 15,000 (fifteen thousand) miles annually, using various modes of transportation including (but not limited to) snow shoes, snowmobiles, four wheel drive pickups, horseback, and helicopter under normal to extremely adverse weather conditions in order to access critical sites located in populated or remote mountain top locations throughout the state. To be able to lift or move heavy objects (100 pounds), including electronic equipment and snowmobiles. The ability to place radios and other electronic devices in vehicles and equipment which requires all types of lifting and maneuvering in cumbersome positions and restrictive spaces such as under dashes and in trunks. Exposure to lethal high voltages, high levels of radio frequency radiation, sulfuric acids, solvents, and lead products. Potential exposure to deadly airborne virulent diseases such as hantavirus.

SECTION V – Signatures

Signature indicates this statement is accurate and complete.

Employee:

Name: _____ Title: _____

Signature: _____ Date: _____

Immediate Supervisor:

Name: _____ Title: _____

Signature: _____ Date: _____

Bureau Chief:

Name: _____ Title: _____

Signature: _____ Date: _____

Division/District Administrator:

Name: _____ Title: _____

Signature: _____ Date: _____

Department Designee:

Brent Rabe/Designee

Chief Human Resources Officer
Human Resources Division

Signature: _____ Date: _____